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Fig. 1.

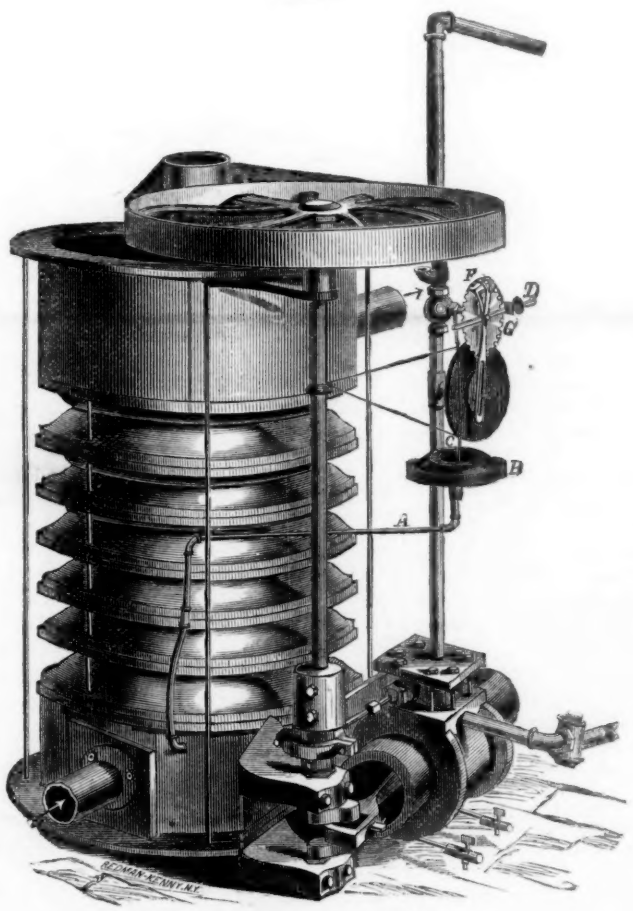
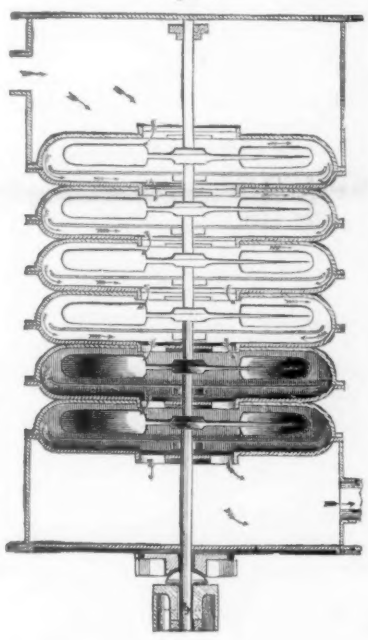


Fig. 2.



Clark's Combined Condenser, Scrubber and Exhauster.

The accompanying illustration of a recent improvement in gas machinery, is a decided novelty.

Since the introduction of clay retorts, an exhauster has become a matter of necessity, and two or three makers of exhausters have in this country monopolized the manufacture of these machines. Some years since, Patrick Clark, the engineer of the Rahway (N. J.) Gas-Light Company, made some experiments on the subject of Centrifugal Exhausters, based on an improvement he had made on fan blowers, which were so successful that he was induced to follow up the matter, and the illustration on this page is the latest result of his experience. His improvement in Fan Blowers consists in constructing them in sections, in such a manner that the air or gas is acted upon successively by several fans, thereby reducing very much the speed they have to be run at to attain the desired results. Applying the principle to a gas exhauster, it was found that it not only balanced the pressure of the holder, but it performed two other offices in gas making of the very first importance, viz: It completely separates the tar and ammonia from the gas.

It is well known to those familiar with gas-making, that one of the greatest troubles incident to working a gas works up to its full capacity, is the passing of tar over into the purifiers, thereby destroying the purifying power of the lime, as well as obstructing the free flow of gas through it, and also the getting rid of the ammonia, without washing the gas to death.

The machine here illustrated performs both these duties in the most perfect manner, while at the same time it does the duties of an exhauster, thereby dispensing with the first cost of condensers and scrubbers, or supplementing them where they are found inadeqaate to the proper performance of their functions.

In the annexed illustration figure 7 is a perspective view of the exhauster, with a small steam engine attached to drive it; the respective arrows show the inlet and outlet of the gas. Attached to the steam pipe is a compensation or governor known to millwrights and machinists as a mill governor, the governor balls being replaced by the vessel B. having stretched across it a diaphragm (not shown). This diaphragm is connected by the rod C to the lever D, which lever when elevated causes the steam valve F to open. and when depressed causes it to close. It is

also connected with the inlet or lower end of the exhauster by means of the pipe A, so that any tendency to a vacuum depresses it, and any tendency to a pressure elevates it, thereby causing the engine to run faster or slower as the gas tends to exert an upward or downward pressure on the diaphragm, and thereby keeping the condition of the gas, as regards pressure, on a perfect balance.

Now, if it performs the function above described, viz., that of an exhauster only, it might be said that we have a very excellent exhauster already in use, which serves that purpose well enough; but in addition, this machine is a perfect condenser.

This result is attained by the mechanical action of the fans running in the various sections shown in Fig. 2. It is now well understood that the separation of tar from gas is *not* due to *diminution of temperature*, but to the *gas impinging against solid surfaces*, which condition is perfectly fulfilled in this machine, as it comes successively in contact with six or more rapidly revolving fans, and is thereby completely separated from the gas. The ammonia is separated by means of the water flowing into the top of the machine through the syphon S, and travels downward in an opposite direction to the gas, and through the same passages which are indicated by the arrows in Fig. 2. The gas is brought in contact with the water while passing each other, by means of the rotary motion of the fans, the contact being so intimate as to almost entirely extract the ammonia, only a slight trace being left.

The machine is perfectly simple, and does not depend for its efficiency on any nice inside fittings, the only part exposed to wear being the collar O on the of the fan shaft, and its bearing, which may be renewep at any time, without in any way disturbing the balance of the machine, these parts being on the outside.

These machines have been in use several years, giving perfect satisfaction, and is now introduced to the gas fraternity as one of the few so-called new things, which is really meritorious.

This machine occupies a space of about three feet square, and is about five feet in height, giving a great economy in the matter of buildings for a gas company, as the work of condensing, scrubbing and exhausting is all concentrated and performed in a most effective manner by this one small machine

Further information can be had from CHARLES NETTLETON, 117 Broadway, New York City, he having used one of these machines for the past three years.

NOTE.—By an oversight the syphon S was omitted in the cut.

A Novelty in Gas-Making.

Some time ago we noticed a new method of heating applied to the conservatories and greenhouses at Niddry House, whereby a great saving of coal was effected. Within the beautiful grounds which surround Mr. Wauchope's mansion a small limekiln was erected, in the flues of which two of the ordinary puddle boilers were fitted up. Attached to these are some 2,000 feet of piping, extending to the most distant of the greenhouses, and the fact that an equable heat has been maintained by this system is abundantly proved by the thriving state of vegetation in the houses. The heat of the kiln being, however, more than sufficient for the boilers of this apparatus, it occurred to Mr. Gordon, the gardener of the estate, that the surplus might be turned to account in making gas; and accordingly in February last an ordinary retort, 5½ feet long by 12 inches in the bore, was built horizontally into the kiln, just above the cast-iron door by which it is fed. The mouthpiece of the retort projects about a foot from the front wall, and from its upper side there rises a pipe by which gas evolved within it is conveyed to an hydraulic main over the top of the furnace.

Through this main the gas passes to the condensers, then to the purifiers, and finally to a gasholder, about 100 yards from the furnace, from which pipes are laid to supply the house. The experiment has proved eminently successful, and it is found that of the heat generated by the burning of the lime there is yet a good deal to spare.

By one charge of the retort with common gas coal, about 100 cubic feet of gas are distilled, and it may be noted that the kiln which supplies heat to the boilers and retort is one with a draw of half a ton per day. The limestone is used in the proportion of two-thirds to one-third of coal, and it is expected that by selling the burnt lime the expenses connected with the making of gas, as well as the heating of the conservatories, will be nearly covered. Were the system carried out to any extent—provided always that limestone could be obtained at a small cost—there would actually be a profit on the operations.

Mr. Wauchope proposes, we understand, to take out a patent for the principle, which can hardly fail to commend itself to country gentlemen and horticulturists.—*Scotsman.*

Air and Ventilation.

At a recent meeting of the Chemical Section of the Society of Arts, Mr. W. N. Hartley of King's College gave a lecture on "Air and Ventilation," which was profusely illustrated by many interesting experiments.

The lecturer, in the course of his remarks, pointed out that too much carbonic acid in the atmosphere vitiated, and this acid was produced largely by the personal heat and breath of living creatures. Air once used in respiration was unfit for combustion or further respiration, until it was again renewed by a copious mixture with fresh air. This fact showed the necessity of ventilation either natural or mechanical—ventilation not simply a supply of fresh air, but fresh air free from draught. Air came through the walls of a house or a room, and entering in that way was free from draught, and this source of ventilation was especially useful in winter, when the cold necessitated the doors and windows being shut. The nose was a very good test for indicating the presence of a polluted atmosphere, for when the nose was offended by a disagreeable closeness the air was more or less vitiated by carbonic acid and organic matter. The proper proportion of carbonic acid was six volumes in 10,000 cubic feet. All crowded buildings were naturally subject to vitiated air from carbonic acid. The law courts were always famous for being filled with foul air, because sufficient air was not given for each person present. The air at some of the theatres had been analyzed, and the atmosphere of the boxes was often as bad as that of the gallery. Between the acts the air was usually very bad, because when the curtain was down the supply of fresh air was cut off, for it mostly came from behind the scenes. The large quantity of gas used in theatres, if allowed fair play, would promote ventilation considerably. In buildings in which large audiences assembled natural ventilation required to be supplemented by mechanical means, and at present the best means for ventilating buildings was that used in an American hospital. It was a rotating fan, which drove the air through pipes, to be distributed throughout the hospital. In summer the air was passed over ice to cool it, and in winter over the hot water pipes to warm it, and when used was allowed to find its way out as it could. In England it was not advisable to change the air of a room more than four or five times an hour, and when moving at the rate of 19 inches per second it did not produce any draught—in fact, it was unfelt. There was one other point to be noticed. There was much carbonic acid in soil, and it should not be allowed to pass from the soil into houses. If the air in the soil was polluted by air escaping from a drain, it might, and probably would, pass into adjacent houses with very disastrous results. It was therefore highly important that attention be drawn to this fact, and he trusted that his lecture would result in calling attention to this matter, which was of the highest importance.

A short discussion followed, and, in reply, the lecturer said he had not analysed the air of the "iron tank" of the British Museum, but from all he had heard it must be pretty foul.—*Iron.*

Chemical Repertory.

No. 132.—May 3, 1875.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1401. PROBABLE REDUCTION IN THE PRICE OF OLIVE OIL.—It is said that the increased quantity of olive oil now manufactured in Tunis is so great, as to be likely to produce a material depression in the price of this article. About 3,500 tons, valued at $700,000, have been shipped during the past year to England, France, and Italy.

1402. USES FOR PARAFFINE.—A water-proofing compound, said to be excellent for leather, and felted and textile fabrics. It is prepared by melting paraffine, and adding gradually a suitable drying oil, stirring well, to produce a thorough mixture, then poured into moulds and allowed to cool. The fabric to be water-proof is first rubbed gently with the block, and afterwards ironed with a warm iron.

1403. AUTOMATIC GAS LIGHTER.—Baumeister employs a small accessory flame, which burns all day, with a consumption of 0·04 cubic feet per hour, or even less, though when less than 0·03 cubic feet, the flame is liable to be extinguished by draft. By regulation of the pressure, this flame is made to flare up and ignite the principal jet, and it then goes out; and again, by a change of pressure, the principal flame is extinguished, and the small one relighted, and the flow of gas to the principal burner again completely checked.

1404, TEMPERING WIRE.—In order to avoid the formation of scale, which cannot be entirely avoided by the use of closed vessels for heating, W. Rath, of Plattenburgh, Westphalia, immerses the wire in a thick, syrupy solution of chloride of calcium before heating. The protecting film formed around the wire is rinsed off with cold water after heating and cooling. An English patent has been taken out for this simple contrivance.—*Iron Age.*

1405. FLAME OF SULPHUR; AND ON DIVERS LIGHTS USEFUL IN PHOTOGRAPHY.—A. Riche and C. Bardy.—The authors have re-examined the bisulphide of carbon and nitric oxide light of Delachanel and Mermet in the hope of finding means to obviate the danger of explosion, either by modifying the manner of operating, or by suppressing the use of sulphide of carbon, and of comparing the various flames which act upon the salts of silver. They recommend as the most efficacious, and as perfectly free from danger, the flame of sulphur burning in a jet of oxygen.

1406. SUBTERRANEAN TALK.—A Reese River miner, temporarily residing in one of the San Francisco hotels, writes: "Through the center of the house a shaft is sunk, and it contains a cage, in which the guests ascend to and descend from the different levels. I live on the first level, and Senator Farrell lives on the third level; but you have to go through several drifts and cross-cuts to get from the shaft to his slope, and he is talking of sinking a shaft down to my level. Maria has got 'stuck,' (or as they say here, 'struck') after the cage, and employs the principal portion of her time in riding up and down the shaft."

1407. EXTRAORDINARY BALLOON ASCENT.—April 16, a party of three persons ascended in the balloon Zenith from Paris, for the purpose of making scientific observations. The balloon attained the extraordinary height of 8,000 meters (over 26,000 feet). Two of the aeronauts were suffocated to death, and when the balloon reached the ground the third was almost insensible, and has since been so ill that his recovery is doubtful. The funeral of these aeronauts took place April 20, and was attended by many gentlemen emin-

ent in the scientific world. Mr. Lomat, representative of the Smithsonian Institute at Washington, made a speech tendering the homage of that institution to the martyrs of science. Other appropriate and affecting remarks were made.

1108. Chemistry of Coal-Gas.—R. Blochmann, in the *Annalen der Chemie*, states that in the incomplete combustion of gas, *acetylene* is formed, a fact asserted before by others. He also prepared gas freed from aqueous vapor and CO_2, passed it through a porcelain tube heated to nearly 1000° C., and analyzed it.

	Composition of gas before passing through tube.	after	
H	49·57	61.96	
CH_4	36·92	30.49	
CO	5·63	5.56	
C_2H_4	3·92	1·25	1·43
C_4H_8	2·17	0·17	
N	0·97	0.86	
	100·00	100·00	
C_2H_2	0·06	0.11 direct est.	

The interior of the tube was found coated with carbon.

1409. A Dangerous Fire.—At 7:30 o'clock March 27, a burst of flame leaped from a barrel of waste, located in the oil room at the Pennsylvania depot, Jersey City. In an instant the inflammable material round-about caught, and a dangerous fire was in progress. The prompt arrival of the Champion Extinguishers located in the depot, and the copious drenching with carbonic acid which the fire was subjected to, quelled the flames before they had time to spread. An alarm was sounded from box 81, located at the depot, but there was no work for the firemen to do. It is said that the fire originated by means of spontaneous combustion among the waste in the barrel.

1410. Glass-Blowing with Petroleum.—The use of crude petroleum in glass houses is a new application, which seems likely to prove successful. Most of the glassware now sold is finished by means of heat obtained from coal in what is technically known as the "glory hole." It is said that the effect of finishing glass by coal heat, is apt to give to the glass a bluish tint, considered objectionable, as well as to injure in some respects the real value of the glass. Experiments have recently been made at one of the glass houses in this city, in which crude petroleum was substituted for coal, and a better quality of glass was produced than that usually made, while the cost was not increased.—*National Oil Journal.*

1411. A Rat Trap.—A trap mentioned by the London *Builder*, called the butcher's trap, has the merit of taking the advantage of the rat's nature and habits in order to compass its destruction. The way of making it is to get a good sized cask and tie over it a strong piece of paper or parchment, like a drumhead. Put this cask in the place infested, and on the head of it a few bones, rice, or orher specially tempting bait. Let this be done at least for a week until the bait disappears. Next place two bricks, one on each other, inside the cask at the bottom, and fill with water to the level of the top brick. Tie on the parchment as you would a jam pot, and with a sharp penknife cut in the centre a cross, about three inches each way. A rat, on passing over the cross-cut, will fall through it, and on getting into the water will at once get upon the brick and make such a squeal as will call all his friends to the top of the cask to slip through the hole themselves. As they will all make for the brick, and a terrific fight takes place to get on it, in the morning nearly all will be found drowned or bitten to death.

1412. New York's Future.—A recent distinguished French traveller, Monsieur Simonin, says:

"What an admirable destiny lies before this city, scarcely marked upon the chart a century and a half since, and which now contains a million souls—two millions with the annexed cities of Brooklyn, Jersey City, and the others that really form a part of the grand New York agglomeration! In twenty years—in thirty years at most—there will be upon this point a population of four millons. London then will be surpassed as London has surpassed Peking; and the first city on the globe, both for wealth and population, will be New York. Cities have their destinies, and in the mysterious phenomenon that presides at their birth and determines their locality, the reasons for their future development exist in the germ. Nature, at the commencement of the ages, had doubtless fashioned this point of Manhattan with a marked preference. Was not the situation happily chosen, among all others, to be used some time for the cradle of the first city in the world?"

1413. Oil and Lightning.—We have before exhorted about the extreme susceptibility of ordinary petroleum tanks surrounded with an explosive mixture of naphtha-vapor and air, to the faintest electric spark. Even during the wintry weather of mid-March of this year lightning had force enough for this sort of explosive mixture. A 10 000 barrel tank of oil, at the Riverside oil refinery, owned by Elkins & Flack, on the line of the Alleghany Valley Railroad, a short distance above Pittsburgh, and two cars of oil standing on the track, were destroyed by fire March 14th. A flash of lightning started the fire. Loss, about $20,000.

1414. Acetylene in Gas.—Berthelot and Landolt have given as the mode of determining acetylene in illuminating gas, to pass the gas through an ammoniacal copper solution, decompose the precipitate, and measure the volume of acetylene evolved. Blochmann proposes washing the cupric acetylide thoroughly with dilute ammonia, filtering, moistening with a little nitric acid, igniting, and weighing the cupric oxide remaining. A careful analysis of the cupric acetylide showed it to have the formula $C_2H_2Cu_2O$, or it contains 75·15 per cent. copper. Assuming that

v = volume of dry illuminating gas passed through the copper solution,

t = its temperature,

p = the height of the barometer,

g = the weig .t of the cupric oxide obtained.

The percentage, by volume, of acetylene in the gas, will be

$$x = 100\frac{g(+0{\cdot}00366\,t)}{v.p.} - 0{\cdot}107055$$

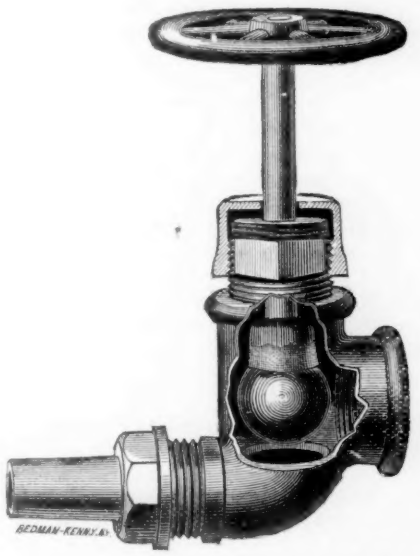
1415. Glazed Paper.—Dr. H. Vohl, of Cologne, states that paraffine which is to be applied to paper as a glaze should be in a very fine state of division. When white or light colors are to be prepared, the following method is recommended: Twenty-four parts by weight of paraffine are first melted, then 100 parts of fine white China clay that has been elutriated and dried is heated to the temperature of melted paraffine and stirred into it. The melted paraffine is entirely taken up by the clay, if the latter was warm enough. When cold the mass is pulverized and ground with cold water in a paint-mill. Four to six per cent. of the desired pigment is mixed with this half-fluid, pasty mass, which is then applied to dry paper in the usual manner. Even the dryest and dull est mineral colors, when treated in this manner show a beautiful gloss. When dark colors are employed, a cheaper and darker-colored clay may be used to mix with the paraffine. In the manufacture of pasteboard this paraffine mixture can be mixed with the paper-stock to advantage, especially for glazed card-board. The board is not only rendered smooth and capable of taking a polish, but it also resists the action of moisture better.

London Gas-Pipes.—Leaden supply-pipes for gas have been used in Munich, some having been in use since 1850. This kind of gas-piping has, however, been found to allow about twice as much gas to escape as an iron one, and, therefore, is being replaced by iron. Detailed experiments establishing this point have been published by Dr. Schilling.

Something New.—The Humphreys Valve, for Use at Consumers Meters.

This valve is made of malleable iron, and is specially adapted to encounter the heat of burning buildings, in which the ordinary meter cock (made of brass) will crumble or melt. It is opened or shut with ease, by sliding the stem up or down, the latter being held where desired by the friction of the packing. It is perfectly tight, and is not so liable to get out of order as the meter cock; its cost being about the same.

The great advantage of this valve is, that in case of fire, when the gas cannot be shut off by hand, the



heat will automatically close the valve, and thereby stop the flow of gas. The certainty of its action in this way will be at once apparent when it is observed that the valve proper is a round iron ball, attached with a soft solder composition (melting at 250°) to the end of the stem, and held directly over the seat. The heat of the fire, melting the solder, releases the ball, which drops into the seat, and shuts off the gas

Reference is made, by permission, io the following gentlemen, well known to the gas fraternity: H. Q. Hawley, President Peoples Gas-Light Co., Albany, N. Y.; Isaac Battin, Engineer Albany Gas-Light Co., Albany, N. Y.; F. A. Sabbaton, Engineer Gas-Light Co., Troy, N. Y.; J. C. House, proprietor Union Gas Works, Lansingburgh and Waterford.

Send for price list to William Humphreys, Waterford, N. Y.

Water-Supply Items.

Legislation at Albany.—We have the following current notes:

April 13.—The Senate passed an amendment to the act providing for the supply of the city of Hudson with water.

April 14.—The Senate Committee on Cities favorably reported an act repealing the famous Water Meter bill of 1851.

April 17.—The Governor signed a bill "amending the Buffalo Hydrant Act."

April 20.—Passed in the Senate amendments to the "Act in relation to the Troy water works" and to the "Act providing for the further supply of water in the city of New York."

April 21.—Sub-Committee of the whole of the Senate favorably reported "Provisions for introducing Croton water at an expense which shall constitute a general charge on the city."

The s me body also passed an act "For the improvement of the Croton Aqueduct in the city of New York."

Also one "Authorizing the village of Glens Falls to borrow money and issue bonds for the purpose of increasing its water supply."

We note some other proceedings, more or less sanitary in character.

April 20.—The Assembly passed an amendment to the Binghampton water act.

April 26.—The Assembly also passed an amendment "To improve the Croton Aqueduct in the city of New York."

April 13.—An act, drawn by the State Agricultural Society, to prevent infectious diseases among cattle was killed in Assembly. The bill is drawn in conformity with the statutes now in force in Connecticut and England, but the usual talk about "book-farmers" and the rights of farmers, from the country members sufficed to defeat the bill.

April 16.—"Senate Committee on Cities reported favorably to-day the bill authorizing the Street Department to take up all the wood and concrete pavements and replace them by wood (stone ?) or Macadam."

April 21.—A communication from the New York Common Council, protesting against bone-boiling establishments in the city limits, was read in both branches of the legislature and placed on file.

Long Island City.—It was expected that water would be introduced into this community on the 16th of April.

Later.—Water was introduced into Long Island City on April 25, amid great rejoicing. Hose was attached to a number of hydrants, and a stream to the height of fifty feet was attained. To-day water will be had throughout the whole improvement district of the city. The system used is that known as the Holly System.

Storage of New York State Waters.—We have already referred to the valuable report on this subject made by Prof. F. H. Benedict. In the Albany *Times* of April 8, we observe a digest, which we shall endeavor further to abstract for our own columns when space may permit.

Philadelpaia.—Water-supply matters are here in an unsatisfactory state, not so much so, however, as they are destined soon to become. The *Ledger* says:

"That the 'patching' policy, which has been the favorite policy for many years, should be abandoned, and that all work on an extensive scale that is now contemplated should be so ordered as to make the new work part of a system equal to the present wants of the city and the probable demands of the near future, ought to be plain enough to everybody. But there is no evidence now to show that any system has been matured."

New Jersey.—A further supplement to act for the punishment of crime came before the recently expired legislature (though whether it passed or not we have not been able to learn), which makes it a punishable offence to empty or deposit into any river, creek, brook, stream, rivulet or water course, the contents of any pump, water closet, cess pool, or the body of any dead animal.

Jersey City.—It is now some time since the following remonstsance was laid before the Jersey City authorities:

"Hoboken, February 25, 1875.

"*To the Hon. Board of Public Works of Jersey City.*

"Gentlemen: The Board of Water Commissioners of the city of Hoboken most respectfully call your attention to the fact that during the last two or three months the supply of water furnished this city has been entirely inadequate and insufficient, the citizens at times, in certain portions of the city, being unable to obtain water on the second floors of their dwellings. This, of course, can, in part, be accounted for by the great waste of water during the intense cold weather. But ever since the abandonment of the twenty-inch main on Hoboken avenue the city has not had a sufficient supply. This Board, therefore, most respectfully request your honorable body to have the said main on Hoboken avenue relaid as soon as practicable.

"On motion of Commissioner Stiastney the members of this Board were requested to sign and the registrar directed to transmit the same to the Board of Public Works of Jersey City."

Some people in Jersey City think that the movement in Hoboken, which has been so strangely pushed by certain parties without consulting the people of the community, to get, at enormous expense, an independent water supply from the Hackensack; is merely a "bluff game," intended to serve the purpose of securing better terms for the water which Hoboken now buys from Jersey City.

Senator Abbett, in the New Jersey Legislature, March 23, attacked the authorities of Jersey City, as follows:

"Dec. 30, 1874, the water debt was $4,459,000 against $1,554,000 in 1870, and all the Board can show for the $3,000,000 increase is a half comp eted reservoir, the contract for the construction of which originally called for the expenditure of only $164,200."

Whether true, or only political Pickwickianism, we can't say. In reference, however, to this said reservoir—about which we gave some information on page 106 of this volume; March 16—we learn as follows:

"Corporation Counsel Lewis, of Jersey City, has reported to the Board of Finance that payments amounting to $334,000 have been made to the contractors for building reservoir No. 3, in violation of the law. The Board has appointed a committee to investigate the matter."

A bill was carried through the New Jersey Assembly—but probably went no further—to allow certain Jersey City sugar manufacturers to supply themselves with water outside the city water works. The *Journal* of that city thinks that "the principle of such a bill would destroy our system of a public water supply."

Brooklyn.—The bill providing for the completion of Hempstead Reservoir for the Brooklyn Water Works passed the Senate April 27.

Unless the Governor dissents therefore, this improvement goes on, as the Assembly has already acted favorably.

Rochester.—Freeman Clarke, Michael Filon, Oscar Craig, Henry Sargent, and Benjamin M. Baker are made a commission to investigate the Rochester Water Works job under a bill introduced April 27, by Mr. Taylor, of Rochester.

Gas Items.

Strange Neglect.—Either gas-works generally about our Metropolis, are losing their time-honored reputation; or else the Brooklyn Board of Health has been prodigiously oblivious about them.

The New York Board of Health having complained that offensive and deleterious odors were wafted across the East River, to the great detriment of the residents of the city, the Brooklyn Board of Health have found, March 21, that the chief cause of the complaint was the manure dumpings of the Long Island Railroad, the milk stables of a Mr. Henry, the swine pens, and rendering and fertilizing works on Newton Creek in Queens County. For once the gas works do not count.

"Popular Science."—From a "popular scientific lecture" delivered at San Francisco March 12, 1875, by Professor Wm. H. Brewer, of Yale College; which of course conveyed deep and solemn conviction to the popular mind; we make the following "elegant extract"—

"The cheapness of gas, considering only the cost of the necessary coal, is rather astonishing to one who has never thought upon the subject. A few years ago the lecturer had occasion to make some inquiries regarding the cost of gas in the Eastern States, and he found that in one large city, deducting the value of the coke, coal-tar, etc., from the cost of the coal, the gas cost but five cents per thousand feet, and it was sold in the same town for three dollars per thousand, though of course this was not all profit."

Gas-Works in Japan.—A correspondent of the London *Journal of Gas-Lighting* gives the following information, writing from Hiogo, Japan:—

"It may be interesting to you to know that gas-works in this country are going ahead. These works commenced making gas on the 1st of September last from Japanese coals, some of which are of good quality, but their produce per ton does not come up to most of the English caking coal, being, on an average, 8,000 cubic feet per ton, of an illuminating power, per 'London' burner, of 15·5 candles. These works belong to a private company, all Europeans. In Yokohama they have had gas-works in operation nearly two years; the company there are Japanese. In Yedo the works have been completed within the last few days. They are small works, and to light the town properly they would require, at least, two more of the same size. That is also a Japanese company. At Hiogo the charge for gas is $4 per 1,000 to private consumers. The public lamps are charged $2.50 per month. Coals cost us $5 per ton, delivered in the store. Trade is very dull at present; in fact, there is nothing doing, and people will not lay out money on gas or fittings, which is a great drawback at the start of new works."

A Yacht Lighted by Gas.—A schooner is being built for Vice-Commodore Garner, of the New York Yacht Club, by Mr. Joseph B. Van Deusen, at the foot of North Seventh street, Williamsburg, which will be the largest centre-board yacht in the world.

This yacht will be piped throughout for hot and cold water and for gas. The hot water will be supplied from a small boiler attached to the kitchen-range, and the cold from a tank built just under the deck. The gas will be carried in portable retorts, and it is estimated that she can take a fortnight's supply.

"Gas-Tanks" on Ferry-Boats.—These we have long ago condemned. We are pleased to see that the Hoboken ferry-boats no longer use them. From the Jersey City Ferry, we get, April 20th, the following:

"One of the gas-tanks on the ferry-boat New Brunswick has given the ferry people some trouble for some time past. The boat having laid up for general repairing, Captain Woolsey directed Mr. Larrabee to examine the gas-tank and put it in order. This forenoon Mr. Larrabee and Mr. Lewis Angle went about the job, but carelessly taking a light too near the tank when they opened it, there was immediately a loud explosion. The tank was shattered, and both men were slightly burned about their faces. Their injuries are slight, and they are fortunate that no more serious penalty followed.

Big Bills.—Exceptionally dark and cold weather, in England, caused, during March, large increase of gas consumption. Among other places, at Birmingham an indignation-meeting of consumers was held about it. The Directors of the gas company replied that they knew of no mode of interfering with the measurement or registration of the meters, each of which has been tested, and stamped by the Corporation, as a guarantee of its correctness.

The London *Journal of Gas-Lighting* "very much fears that this undoubtedly true explanation will not satisfy the dissatisfied consumers at Birmingham and elsewhere. Gas is such a mystery to the general public, and mendacious agitators have instilled so much falsehood into the public mind, that we can hardly wonder at simple-minded people believing they are cheated. It is of no use explaining, and gas companies must content themselves with the approval of their consciences, and the powers they have to recover just debts."

New Jersey Gas-Legislation.—To the items in our last, we may add the following; though we have not yet learned that any of these local measures became laws.

March 31, Mr. D. Henry withdrew a bill for the inspection of gas meters in Paterson and introduced a bill for the inspection of gas and the sealing of gas meters in the cities of Paterson and Passaic.

NEW YORK CITY GAS MATTERS.—The following information was accidentally overlooked in making up our last, when speaking of the bids for New York street-lighting.—The Gas Commission—consisting of Mayor Wickham, Commissioner Porter, and Comptroller Green—met April 7, and awarded contracts for lighting the city for eight months from May 1 as follows:

New York Gas Company, district below Grand street, $16 per lamp; Manhattan Company, district between Grand and Thirty fourth streets, $16; Metropolitan Company, part of district between Thirty-fourth and Seventy-ninth streets, $34; Mutual Company, remainder of the same district, $16 50; Harlem Company, district above Seventy-ninth street, $25.

THE METROPOLITAN CO.'S LITTLE BILL.—We have referred to this matter March 16. Comptroller Green aroused much astonishment at a meeting of the Public Boards, on April 10, by begging for an appropriation looking to the actual payment of this claim, or at least part of it. He desired that $186,000 New York City bonds be issued to provide for the payment of this debt among others. The impression had gone abroad that this esteemed "servant of the public" never by any chance consented to any payment for services to said public, except under judicial compulsion.

April 13, the New York Senate passed an act "amending the act authorizing the formation of gas-light companies." We do not know yet any of the particulars.

LONG ISLAND CITY.—The newspapers still say hard things anent the gas here. The *World* furnishes the following:

Some of the largest factories in Long Island City, together with the Long Island Railroad depot, the James slip ferry-house and a number of private dwellings, have been obliged to discard the use of gas and substitute kerosene oil, the quality of the gas rendered being of such a poor quality as to cause a discontinuance of it.

The After-Damp of Explosions in Coal Mines.

By Mr. J. W. THOMAS, Cardiff.

The causes of explosions in coal mines, and the best methods of preventing their occurrence, have been made the subject of careful consideration and investigation, and the mining world has long ago come to the conclusion that efficient ventilation is the only safeguard and prevention. Still, explosions happen, and probably will happen, and the best ventilated colliery is not absolutely proof against them.

This has been repeatedly brought forward by eminent mining authorities, who have shown that any working portion of a mine may become almost instantaneously filled with an explosive mixture, derived from sources over which there is often little control—as, for instance, by the sudden outburst of gas from a strong blower—and that such mixture may, unfortunately, be fired under unforeseen circumstances.

It must not be inferred from these remarks that all collieries are liable to become filled with explosive mixtures, and the above observation applies, in fact, only to those collieries which are situated in the fiery or marsh-gas zone, as it is sometimes termed, of the North of England and of the South Wales basins.

Much has been done of late to ensure a thorough practical and scientific system of ventilation, and the various, as well as ingenious, methods devised for the purpose of conveying, regulating, dispersing, and dividing the currents of air, are a sufficient proof of the attention which has been bestowed upon this branch of mining.

It is somewhat strange, however, that up to the present time there is no work on mining which gives any insight into what actually transpires at the moment of explosion; and our knowledge of the products of combustion, and of the conditions under which an explosion takes place, as well as of the limits of an explosive mixture, is far from being perfect.

It is true such knowledge would not materially aid us in preventing the occurrence of explosions. The frightful loss of life which they entail should, however, of itself awaken a desire to make ourselves acquainted with the conditions under which death ensues, whether by burning, suffocation, or other cause, and if possible to devise some method of reaching the sufferers who, untouched by the ignited marsh-gas, are nevertheless doomed to death from the effects of the products of combustion.

Tables have been constructed by able mining authorities, showing the proportion of air required by marsh-gas for its complete combustion. Theoretically this is a matter of no difficulty, since twice its volume of oxygen is the necessary quantity. And as atmospheric air contains 20·88 per cent., or rather more than one fifth of its volume, the requisite amount of oxygen for the complete combustion of one part of marsh-gas will consequently be furnished by 9·5 parts of air. It is also easy to tabulate the ultimate products of the combustion of this mixture, viz., carbonic acid, water, and nitrogen. But to lay down a rule wherefrom to calculate the percentage composition of the resulting products of an explosion in a mine, and to point out that a given number of parts of air and marsh-gas give rise to the most severe or deadly explosion, must evidently appear fallacious. Tables of this kind have been published, and are used by colliery officers. But to arrive at something like a correct idea, we must take into consideration what practically happens when an explosion takes place.

It is evident that previous to an explosion in a single heading, gallery or gallieries, there exists at the time—in the field of such explosion—marsh-gas and air mixed *in every proportion*; varying from one part of fire-damp to ninety-nine parts of air, or from ninety-nine parts of fire-damp to one part of air. There will be found, in fact, mixtures of these gases in proportions in which they will readily explode, as well as in proportions in which they do not explode.

It is difficult to define the limits within which a mixture of these gases remains inexplosive when in contact with a readily explosive atmosphere which by some accident may be fired. From the experiments of Davy, Henry, Bischof, and other eminent authorities, we are well acquainted with the theoretical proportions of marsh-gas and air which will cause an explosion, or ignite under ordinary conditions of temperature, etc., in a mine, provided that the fire-damp consisted entirely of marsh-gas.

As experiments performed in the laboratory are almost invariably carried on with pure marsh-gas, the results are probably higher than those which would be obtained from fire-damp; for, marsh-gas either when evolved from the working-face of coal, or from blowers, seldom exceeds more than 97 per cent. of the volume so given off.

It has already been stated that when 9·5 parts of air are mixed and exploded with one part of marsh-gas, the whole of the oxygen present is consumed, carbonic acid and water being formed.

Owing to the strong currents of ventilation passing through a mine, the air is, however, always charged with floating particles of coal, incidental upon the process of working: coal ground into fine powder by the wheels of the trams, horses' feet, etc. Hence, it is conceivable that very little oxygen may be left unconsumed, even if thirteen parts of air be mixed with one part of fire-damp, which is probably the theoretical explosive limit of a mixture of fire-damp with air.

Davy's experiments proved that mixtures of marsh gas with air do explode, even if the oxygen present be insufficient for complete combustion; and he has left it on record that when one part of this gas mixed with six parts of air, was exploded by an intense electric spark, an expansion of volume resulted. Up to the present time it has been taken for granted that mixtures of marsh-gas with less than 9·5 parts of air will explode, and that carbonic acid and water are formed, as much of the hydrocarbon being broken up as the oxygen will allow, the excess remaining unaltered.

Doubting the correctness of this generally accepted creed, and guided by the results of Davy, I was led to make some experiments in June last in the gas-laboratory of the Royal College of Chemistry, South Kensington, upon a sample of gas which, on analysis, was found to contain 97 per cent. of marsh-gas, and I observed that a totally different reaction occurred.

Being engaged at the time, however, in a series of experiments on the gases enclosed in coals from the South Wales basin, I postponed the further investigation for some future occasion. In the meantime, Dr. Meyer, a German chemist, has published in the November number (1874) of the *Journal fur Practische Chemie* the results of his investigation of this hydrocarbon, as well as of acetylene and hydride of ethyl when mixed and exploded with oxygen in proportions for incomplete combustion.

The results obtained by Meyer agree in all respects with those which I had found, and the law which he deduces is entirely borne out by my experiments. Meyer gives the data of two analyses, which show that when marsh-gas is mixed and exploded with oxygen in equal proportions, as well as in the proportion of eight of the former to nine of the latter, the whole of the hydrocarbon is broken up, and carbonic acid, water, carbonic oxide, and hydrogen are formed; and he concludes that, in all cases of incomplete combustion, marsh-gas is nevertheless entirely broken up, and that if mixed and exploded with half its volume of oxygen, carbonic oxide and free hydrogen only are formed. I have found, however, that marsh-gas mixed with half its volume of oxygen does not readily explode. The experiments which I made with larger volumes of oxygen, such as mixtures containing fifteen and seventeen parts respectively, with ten of marsh-gas, conform likewise to this observation, viz., that the whole of the carbon of the marsh-gas combines with oxygen to form carbonic oxide and carbonic acid, while the affinity of the hydrogen for the oxygen increases, more or less, according to the quantity of oxygen present.

A general opinion has hitherto prevailed among chemists that the affinity with which hydrogen combines with oxygen to form water, is quite equal to, if not superior, to that of carbon to form carbonic oxide or carbonic acid. Bunsen has shown that when a mixture of carbonic oxide and hydrogen was exploded with a quantity of oxygen insufficient for complete combustion, equal proportions of these gases were respectively converted into carbonic acid and water. This is not the case, however, with marsh-gas, as from the preceding and following experiments the superior combining affinity of the carbon over that of the hydrogen of the marsh gas will be clearly shown.

Still the relative affinities of these gases do not remain constant, as the following experimental deductions illustrate:

1. When the proportion of oxygen in a mixture does not exceed half the volume of the hydrocarbon, no hydrogen is consumed on explosion; the residual gases consist of carbonic oxide and hydrogen, the latter gas occupying twice the volume of the former.

2. The superior affinity of carbon manifests itself when ten parts of marsh-gas are exploded with seventeen parts of oxygen, as the remaining gases contain *some* hydrogen, while the *whole* of the carbon combines with oxygen to form carbonic acid and carbonic oxide.

3. When the oxygen mixed with marsh-gas *nearly* reaches the proportion of two parts of the former to one of the latter—which is the requisite amount for complete combustion—the *whole* of the hydrogen is transformed into water, while twice as much carbonic oxide remains as will correspond to the deficiency of oxygen.

From the results of numerous experiments it would

appear that when marsh-gas is ignited in a mine with 4·5 times its volume of air, only 10 per cent. of its carbon forms carbonic acid and 90 per cent. carbonic oxide; a little hydrogen at the same time being converted into water, while the greater part remains free; and it is highly probable under the favorable conditions of temperature, etc., which exist at the moment of explosion that large volumes of marsh-gas when mixed with small proportions of air—say three parts, for instance—are entirely broken up into carbonic oxide and free hydrogen.

With five volumes of air the carbon of the marsh-gas forms 13 per cent. of carbonic acid and 87 per cent. of carbonic oxide. With six volumes of air about 20 per cent. of carbonic acid and 80 per cent. of carbonic oxide, the latter gas decreasing as the oxygen increases, until with 9·5 parts of air carbonic acid and water only would be formed, if it were not that the floating particles of coal, ignited by the flame passing through the explosive mixture, consumed a portion of the oxygen. The volume of carbonic oxide generated during an explosion must therefore be very considerable, especially when the percentage of marsh-gas is high

Hydrogen gas in large quantity is also liberated, as every volume of marsh-gas which is broken up sets free twice its volume of hydrogen. Only a small portion of this is converted into water, when the oxygen present does not much exceed half the volume of the marsh-gas. When twelve volumes of this gas are exploded with twenty volumes of oxygen nearly the whole of the hydrogen is consumed, the residual gases consisting for the most part of carbonic acid and carbonic oxide.

It will be observed that the larger the bulk of marsh gas which is mixed with less than 9½ parts of air, the more serious will be the results of the after-damp, and it is probable that after every explosion the remaining gases contain as much, or even more, than 3 per cent. of carbonic oxide in that portion of the mine which is filled by the ignited gases. Diffusion and air-currents carry this poisonous mixture throughout the mine, and fill the main galleries leading to the mouth of the down-cast shaft, thus cutting off every chance of escape, unless the main airways remain undamaged, and the ventilation unimpaired.

The fatal effects produced by after-damp have long been an enigma to practical miners. It may readily be understood that the force of an explosion is tremendously powerful, as is proved by the appearance of that part of the mine where the explosion happened. It can also be imagined that the unfortunate miners, in, and proximate to, the ignited mixture, have little chance of escape, the carbonic acid which is formed, together with the nitrogen which is left, being sufficient, in the absence of oxygen, to finish by suffocation the deadly work which the fire and force of the explosion have begun.

But it is too well-known that the fatal effects of the after-damp are not confined to the galleries or headings in that part of the mine where the explosion took place, but also that very many lives are constantly lost in such parts of a mine as are far removed from the scene of the explosion, and in such parts also where, in spite of the explosive force, which crushes and blows down the doors used for dividing the ventilating currents, much air will have been mixed with the products of combustion so as to dilute them. It has often been observed by parties who have descended in search of the victims that the lamps carried down with them still continued to burn brightly, while many of the explorers have fallen insensible, and have been borne back with difficulty by their comrades. We have also instances recorded of dead bodies being found after an explosion with lamps burning by their side.

Hitherto carbonic acid, even when mixed with much air, has been looked upon as the cause of the fatal effects produced; but is carbonic acid really poisonous? Carbonic oxide, we know, is poisonous in the highest degree, and 1 per cent. of this gas is sufficient to cause death, when breathed for a very short time even.

Leblanc published in the "Annales de Chimie et de Physique" some very interesting and valuable experiments upon this gas; and the following two examples taken from the above publication, will, I believe, be quite sufficient to show how probable it is that the fatal effects produced in the instances above related were caused almost entirely by carbonic oxide. An atmosphere generated by burning charcoal in a close room was found on analysis to contain ·54 per cent. of carbonic oxide, 4·61 per cent. of carbonic acid, 19·19 per cent. of oxygen, and 75·66 per cent. of nitrogen. A dog which was kept in and compelled to breathe this mixture died in twenty-five minutes from the time when the charcoal was ignited, whereas a dog survived which had been shut up for three-quarters of an hour in a mixture of carbonic acid and air containing no less than 30 per cent. of the former, when he was removed at the expiration of that time.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Controversial.

Ciacinnati, April 7, 1875.

Mr. Editor: In the American Gas-Light Journal of March 16, 1875, I observe Mr. Farmer redeems his promise contained in a previous issue, by "presenting to your readers another simple arrangement for removing the seal of dip-pipes in hydraulic mains" The importance of this subject has assumed such magnitude as now to occupy the serious attention of gas men, and all devices tending towards its attainment deserve to be carefully examined and studied, as well as the utmost encouragement given to those to whose ingenuity and experience we are indebted for the many practicable (as well as impracticable) methods of accomplishing this object.

In neither of the communications accompanying the two arrangements alluded to, does Mr. Farmer make direct claim to the ideas embodied in them; but from the absence of anything to the contrary, we are forced to the conclusion that he is willing to take credit to himself for their invention—if not, is there any part of the details he can truthfully claim? and if so, how much? We wish to give him all the credit to which he is justly entitled, he has no right to desire more. Are we to expect him to cast off a "new arrangement" every week or two as your operators cast off copies of your Journal? or shall we look upon him, in this speciality, simply as a compiler of the various devices "for removing the seals of dip-pipes in hydraulic mains" which may come under his notice.

The arrangement as presented in your last issue can lay no claim to originality, so far as Mr. Farmer is concerned. The principal novelty of this invention—referring to the "arrangement for raising and lowering the dip-pipes"—was patented in England some years ago, by Mr. Chandler, an illustration of which may be found in the Number, dated August 11, 1874, of the "Journal of Gas-Lighting," London, since which time, he, together with Mr. Stevenson, has patented a further improvement, which renders it entirely automatic in its action, and of course rendering unnecessary the apparatus for raising and lowering the dip-pipes; which, Mr. Farmer admits, "appears at first sight to be somewhat complicated." The application of tubes dipping into the liquid of the hydraulic main in place of stuffing boxes, is not new. Mr. Trumbore has the same principle in use in his patent of April 12, 1871.

The system of levers, fulcrum, and rods, arranged to facilitate the manipulation of the dip-pipes from the floor, is an ordinary appliance in general use everywhere.

The whole device, it seems clear to me, contains no element of originality whatever; the "principal novelty" being simply a reproduction of Chandler's arrangement, only modified somewhat in one or two unimportant details, and presenting a slight difference in its general outward appearance.

One of the difficulties which Mr. Farmer designs to counteract by the above arrangement, viz., the variation of the seal on end of dip pipes, arising from the irregular settlement of the hydraulic main, or other cause tending towards displacement of seal, has been admirably overcome by Mr. Burtis, Superintendent and Engineer of the Chicago Gas-Light and Coke Co.'s Works, in his patent of April 8, 1873.

Any light which Mr. Farmer can throw upon the exceedingly important subject of seals on dip-pipes, shall certainly be received with much interest, and an honest acknowledgement of the sources from whence they originated, will not fail to be duly appreciated.

Yours, etc.,
Out West.

[In accordance with a rule which we shall follow—when it may be found possible—in case of controversial communications which are signed only pseudonymously or, are virtually anonymous; we have submitted the above to Mr. Farmer himself; and append to it some comments which he has jotted down—Ed.]

COMMENTS BY WM. FARMER.

Mr. Editor: I have read the above letter, and I beg to say that I think there is a great difference between the dip-pipes he refers to and mine.

The Chandler dip-pipe has a stuffing-box and rod over the centre of the pipe, in the arrangement for raising and lowering the pipe. This will be liable to leak, and will also be in the way when the pipe requires to be drained. Consequently my combination is not like Mr. Chandler's.

The Trumbore dip-pipe has a rod and dip-tube fixed right down the centre of the pipe, and consequently will be very much in the way when the pipe requires to be cleaned out; the dip-pipe is short and depends on a ground joint to make it gas-tight, which will be liable to leak.

Therefore my arrangement of the parts is not like Mr Trumbore's in any particular. For illustration and comparison, see American Gas-Light Journal, vols. 14 and 22, pp. 147 and 101.

My arrangement requires neither *stuffing-box* nor *ground surfaces*, and does not require any *rod* or dip-tubes in centre of the pipe; consequently mine is much more simple and efficient than either the Chandler or Trumbore dip-pipes.

Wm. Farmer.

Freezing of Hydrants.

Office of Grand Rapids Gas-Light Co.,
Grand Rapids, Mich., April, 8, 1875.

Mr. Editor: In your issue of the 2d inst., you allude to the trouble they have had in Brooklyn, during the past winter, with frozen hydrants. Almost every town north of the Ohio River has been troubled that way, and in many places the mains have frozen in the street. We have commenced a system of works for this city, laid twelve miles of pipe last year, and set 125 hydrants. It may interest engineers to know that the Wykoff patent pipe and Lowry Hydrants in use here have never frozen so as to occasion the least inconvenience or expense.

Respectfully,
Thos. D Gilbert.
President Board Public Works.

Sanitary Pharasaism.

[We take the following from the New York *World*; and append to it a few sentences from another authority, of precisely the same standing. Which are we to accept? At present deponent saith not.—Ed.]

The New Yorker who has forgotten or never known the days of corner pumps, and who exercises his constitutional right of grumbling whenever the Croton Aqueduct Department requests him to practise economy in the use of water, may perhaps be brought to a partial sense of gratitude for the average aqueous blessings he enjoys by reflecting on the contrasted condition of affairs in London, where, after genera

tions of subjugation to private monopolies, an effort is now inaugurated in Parliament to "make more effectual provision for a constant supply of water, and for the protection of life and property against fire in the Metropolis," by establishing a "Metropolitan Water Commission" which shall have power to acquire, combine and increase the sources of supply and works of the different existing companies. At present the various parishes of London are supplied by eight joint-stock companies whose dispensing, both as to quality and quantity, falls somewhat short of an ideal standard of excellence. In many houses the supply is "intermittent," which means that a tank on the premises is filled at certain intervals and then the delivery stopped, leaving the empty pipes to suck up sewer-gas, or, (as has demonstrably happened in several recent instances) to be polluted by the leakage of putrescent matter from the surrounding soil. Furthermore, in the words of an eminent English hygienist, "the constant supply does not mean an unlimited supply, nor is it the fact that the water in the house-pipes is always in direct communication with the water in the reservoirs." With the exception of the Kent Company's water, which is taken from deep springs and very pure, the supplies furnished from the Thames, New River and River Lea are always more or less contaminated with organic matter, the Thames water especially, despite all arrangements for filtration, containing a notable admixture of sewage, while the pumps to which many Londoners still resort emit in almost all instances, a horribly impure fluid. Even under the proposed commission it will scarcely be possible to provide an adequate supply of really pure water for the English capital. Let the consumers of untainted Croton, therefore, take heart of grace, and be thankful that as regards their potable waters they are not as other men, or even as these Britons.

At this moment the thawing snow is carrying into the Croton River the washings of half the barnyards in a large section of Putnam and Westchester counties, and the washings of the whole surface as well, including, perhaps, many points even less fragrant than barnyards, for, startling as it must appear, an adequate process of filtration is utterly ignored by the authorities.--New York *Herald* Editorial, March 1875.

Gas Explosions.

The following article we extract from a recent issue of the *Sanitary Record*, for the consideration of our readers:

Gas explosions have never been so frequent as during the past few weeks, and it is high time that the causes of these accidents were thoroughly inquired into. If, as a late writer on sanitary matters explains, we employ a gas-fitter who is not a gas fitter, but a Jack-of-all-trades, a blacksmith, whitesmith, glazier, brazier, plumber and bell-hanger," all rolled into one, we may safely look out for nuisances arising from our gas pipes—in the positive degree, waste of money; in the comparative degree, bad smells; and, in the superlative degree, suffering and death.

The same writer explains how careless we in England seem to be about our gas supplies, the companies caring not one farthing what desperately bad work may be done inside the house, and the householder apparently caring as little, content if his fitter informs him that all is now connected to the meter, and that he may light up. Strange it is, and disgraceful too, that perhaps not half a dozen gas fitters in London even proceed systematically to test the pipes for leakages before finally leaving the work. Very few go to the trouble of fixing a temporary burner on each floor, and then, igniting these jets, allow them to burn for a short time and try and discover by sense of smell any faults of the pipes laid on the way to these trial jets. Fewer still take the trouble to turn out the gas, take at the same time the reading of the meter, and note whether, after the lapse of a few hours, the finger on the dial still indicates a consumption of gas, in which case it is simply being disseminated over the house.

The proper manner in which to test house pipes—we do not speak of testing the pipes themselves before they are laid, for that the pipe makers mainly do, but to test them after every ramification of iron barrel and composition tube has been duly fitted up—is to adopt a plan which we understand is largely practised in America, and as it is as simple as possible, it ought, we think, to speedily become naturalized among us. We will suppose a mansion to be fitted up by a gas fitter for the proprietor, every pipe in place, and all ready for screwing up the brackets or pendants. This being so, the gas fitter stops up all the outlets with screwed caps or other contrivances, all but one, and to this he affixes a force pump, with a few drops of sulphuric ether dropped into its interior. The pump is now connected with a gauge, and set to work up to some moderately high pressure—sufficient, at all events, to find out any weaknesses, such as small holes or opening seams owing to imperfect welding. When the gauge registers a certain figure the pumping is stopped, and if the pressure lessens, it is evident that the pipes are somewhere unsound, and these imperfections are sought for. If they cannot be found by the smell of the escaping ether, the pipes are lathered over with soap, and the leaks detected by the bubbles. This experiment is repeated until the gauge ceases to show a loss of pressure, and then only, need the fitter trouble the gas company about an attachment to their mains. The official of the company—for he is an official in every sense of the word—looks at the dial, which now indicates no loss of pressure, and hands over his authorization to connect. This is an amount of precaution that in our country we very rarely attempt; indeed, we question if twenty journeymen gas fitters out of one hundred ever heard of it.—*Iron Age.*

The New Paris Water Works.

The great reservoirs at Montsouris for the reception of the waters of the Vannes possess great interest for the hydraulic engineer. It will be remembered that in July last a portion of the arched roof gave way. The accident has now been repaired, and the water will be let into the upper reservoir in a short time. The arches have been reconstructed as before—that is to say, two bricks thick—but the piers and supporting walls have been strengthened, and the vaulting supported in such a manner that should one or more arches fall in they will not carry the rest with them. The area of the reservoirs is 34,000 square meters, and they are two stories high, with an enormously thick wall in the middle of the whole, which divides the reservoir into four chambers, two below and two above. All the masonry of the lower chambers has been finished for a long time, but the conduits and pipes for the distribution of the water remain to be executed. The upper chamber, of which the vaultings have been reconstructed, and which has an area of 17,000 square meters, and will contain 75,000 cubic meters or tons of water, will be the first filled.

The hundred arches which cover this chamber are being covered gradually with mold to the depth of ten inches, and when this is done, and the arches show no tendency to give way, the mold will be sown with grass seed. The quantity of earth will be about 2000 cubic meters. Several hydrants are placed around the edge for the purpose of irrigating the grass. The second upper chamber is now being constructed, and is about one quarter finished. Around the reservoirs earth is now being thrown up to the height of the roof of the lower chambers, with the double view of adding support to the walls and of keeping the water within fresh. At one of the angles of the main structure rises a structure 40 meters square, and with walls two meters thick. This is the receiving chamber, and has been for some time in use. Its capacity is about 30 square meters by four meters deep. The bottom and sides are covered with bluish-white tiles, and the water is so pure and translucent that a motto inscribed on the tiles at the bottom is plainly visible.

At the bottom of this smaller reservoir may be seen the orifice of a pipe 1·05m. in diameter, which will carry the water to a point five meters above the level of the ground; opposite to this is another pipe of the same dimensions, which, when there is an overflow of water, will carry it to the main sewers. Just in front of this receiver are three pipes, two of them 90 centimeters in diameter, and the third somewhat less, bound together by means of a cast iron hood, and fitted each with valves. One of these will serve to fill the upper chambers of the main reservoir, a second the lower chambers, and the third, and smallest, already supplies the highest portions of Passy with water. At the base of the recipient chamber is a telegraphic office, which is in communication with another at the reservoirs of Arcueil, with the prefecture of police, and several other public establishments, to aid in the regulation of the whole service of the city. The public is admitted to view the recipient chamber, and the purity of the water, which will shortly supply a very large proportion of the population, is a constant theme of admiration.—*Iron Age.*

The Gas-Imp.

I was sitting one night by my fire—
T'was a fire of Westmoreland coal
With a mixture of coke which I recommend
As comfort for body and soul.

My chamber was cosy and warm:
The curtains were closed all around;
And the snow at the windows rattled away
With a soft and tinkling sound.

As I sat in my easy chair,
I think it had got to be late;
And over the top of my book, I saw
A face in the glowing grate.

An ugly face, too, it was—
With wings and a tail—I declare;
And the rest was ashes and smoke and flame,
And ended I don't know where.

So queer were the features, I said
"I must put you on paper mo friend;"
And took my pen and jotted him down—
Face, wings, and wriggling end.

A queer old codger he seemed,
As vagnely he stared and shone;
But I fixed him in outlines as well as I could
And added a touch of my own.

He flapped his wings in the grate,
And struggled and puffed to be free,
And scowled with his blazing carbuncle eyes
As if he appealed to me.

Then I said—but perhaps I dreamed—
"Old fellow—how came you there?"
"I am not an old fellow"—the face replied,
"But a prisoned Imp of the air.

"In the shape of combustion and gas
"My wings I begin to find out;
"So I flap at the bars and grow red in the face,
"And am ugly enough no doubt.

"I was made for a much better lot;
"But I cannot escape as you see;
"Blistered and burnt, and crammed in a grate—
"What *could* you expect of me.

"I once was a spirit of air,
"A delicate fairy page
"Long, long ago—in fact before
"The Carboniferous age.

"For centuries I was kept
"Imprisoned in coal-beds fast
"When you kindled your fire, this evening, you see,
"I thought I was free at last.

"But it seems I am still to wait;
"No wonder I'm cross as a bear,
"Make faces, and flutter my wings of flame,
"And struggle to reach the air."

"My ruby-faced friend," I said,
"If you really wish to be free,
"Perhaps I can give you a lift or two.
"It's easy enough. We'll see."

Then taking the poker, I punched
A hole in the half burnt mass—
When the fire leaped up, and the Imp flew off
In a laugh of flaming gas.

—C. P. Cranch, in St. Nicholas for February.

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

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(Immediately fronting the Ferry Houses.)

This is a recognized official organ of—

LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

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☞ All communications to be addressed to **"The Proprietors,"** No. 42 Pine Street, Room 18, New York.

MONDAY, MAY 3, 1875.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 11 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to eight cents, and the registration system has been found by the postal authorities to be actually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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[CIRCULAR.]

SEMI-ANNUAL MEETING AMERICAN GAS--LIGHT ASSOCIATION; TO BE HELD IN WASHINGTON CITY, MAY 12 AND 13, 1875.

Excursion tickets from New York City to Washington and return, can be had for $10, by applying to Charles Nettleton, Secretary, 117 Broadway, New York City.

These tickets can be issued to persons wishing to attend the meeting, and to their famiiies, and can be used on the 11th and 12th of May, in going to Washington, and are good till the 25th for a return to New York.

All those going to the meeting from, or by way of New York City are requested to go in a car together, leaving for Washington at 3 P. M. on the 11th, and those living on the line, and going from Philadelphia, are invited to join the party on the route. The train reaches Washington about 11 P. M. Trains leave New York for Washington at 8·40 and 9·30 A. M., and 3 and 9 P. M.

Presidents, Vice-Presidents, Directors, Engineers, Consulting Engineers and Superintendents of gas companies, individual managers of a gas works, and individuals practically skilled in the construction and management of gas works, are eligible to active membership.

Every gas company in the United States and the Canadas is respectfully invited to become connected with the Association, by having some one or more of its officers an active member of the same. Individuals qualified for active membership are also cordially invited to join the Association.

The expense—$10 for initiation fee, and $5 yearly thereafter—will be many times repaid to the company or individuals, by the improvements in processes of manufacture they will from time to time be enabled to make, resulting from the papers read, and the discussions upon the same had at the several meetings of the Association, and from private consultations with each other.

The members being brought together from the different parts of a wide country, a laudable ambition to improve and excel in their art is induced among them—in a measure, insensibly to themselves—by their personal intercourse and conference with each other, as to their different ways and manner of doing the different parts of their manufacturing work—often a simple thought or suggestion, of some simple way to produce a result, or accomplish an end, is obtained at the meetings of the Association, more than sufficient in value to compensate for all expense of membership and attendance at such meetings.

Some may say that they get all the benefit by reading the reports of the meetings, as published in the GAS-LIGHT JOURNAL. To such persons let me say that you get only a very small portion of the benefits in that way. The private discussions by members, with each other, being far the most important; and, besides, in unity there is strength. By joining the Association, and contributing to its support, every person so joining and contributing becomes a part of a body whose united power and force is, and is to be, exerted to advance the interests of each of its members—*i. e.*, the discovery of ways to make gas cheaper, and of better quality; results, more profits, higher dividends, and, best of all, better salaries.

CHAS. NETTLETON,
Secretary.

LATER.—I am now able to announce that at the meeting a paper will be read by Mr. Theo. Forstall, of New Orleans—"On the Proper Preparation of Lime, for use in Purification." A paper on—"Unaccounted-for Gas; and the proper Method of its Computation"—is also expected.

C. N., Secy.

THE GAS-LIGHT ASSOCIATION AT WASHINGTON.

It happens fortunately that, on this occasion, we can, through these columns, just about reach a large proportion at least of the American gas-fraternity, in time to give them a timely reminder of the excellent opportunity that now offers, on the 12th of this month, for such a reunion of the profession, as never before—at the capital of the Nation.

The Secretary, Mr. Nettleton, has already stated the arrangements that have been made; one or two of which, however, it may probably do no harm, but, on the contrary, may be well, for us to reiterate. Willard's Hotel will be the place of rendezvous. Those who take New York in their way, may obtain, by application to the Secretary, railroad tickets from this city to Washington and return, for ten dollars in all. Those entitled to become members are all officials of gas companies and persons "practically skilled in the management and construction of gas works"; this latter sentence being the language of the constitution. We might cite further here, to advantage, from that instrument. Applicants for active membership must address the Association, through the Secretary, with the endorsement of two active members. No entry is made on the minutes, in case of rejection of an applicant balloted for. The initial fee for membership is ten dollars, and five dollars annually thereafter. Fifty dollars, on payment thereof, constitutes a life-membership. Subjects presented for consideration must relate to manufacture, distribution or consumption of gas, and must be approved by the executive committee, being submitted thereto through the Secretary.

We do not doubt that any person, whether connected or not with the gas-profession, including those not in *practical* familiarity with the work of the profession, who may nevertheless have a question or subject of interest or importance to bring before this national organization, of direct or indirect application to the gas-manfacture, or any of the arts collateral thereto, will find a welcome and appreciative reception.

This Journal has already taken its stand in reference to the Association. Believing that no possible harm can, in the nature of things, arise from the movement, but that it involves the elements of inevitable and unmixed good to all concerned; we have already made, and we shall hereafter make, every practicable effort to aid the extension and consolidation of the American Gas-Light Association, over this Continent; and to diffuse a knowledge of its transactions throughout the civilized world.

A "TRULY PRACTICAL" OPERATION.

A remarkable case of reasoning and working by "rule of thumb," occurred during the difficulty encountered last month with the "ice-gorge" at Port Jervis, N. Y. Some one conceived the brilliant idea that a few barrels of cheap petroleum-naphtha would "chaw-up" the enormous mass of ice in a "pigs whisper." The expensive experiment was made, with 25 barrels of naphtha, with the loudest possible glorification and flourish of trumpets on the 14th of March. The result, as reported, was that the

burning of the naphtha "made literally no impression on the ice." Huge astonishment, of course, on the part of the ingenious but nescient inventor of the scheme, and his aiders and admirers.

Now let us see what the rules of science *would have* told them, had they taken the trouble to apply them, or a little simple arithmetic founded on them, before carting their naphtha-barrels on to the ice. Twenty-five bbls. of naphtha contain 1,100 gallons, which, at 7 lbs. per gallon, would evolve 154,000,000 heat-units. Now the latent heat of fusion of ice is about 144° Fahr.; so that this amount of naphtha, supposing the ice to be only as cold as the freezing point, would melt 154 millions divided by 144 equal 1,070,000 lbs. of ice. This at 60 lbs. per cubic foot, is about 18,000 cubic feet of ice. Supposing the gorge to have been 18 feet thick, this would be an area of about 31½ feet square. This is assuming that *all* the heat of the burning naphtha could be utilized, and applied to the fusion of the ice. This would, however, be impracticable, of course; and in reality probably half of it would be wasted. So that a little, and precious little, Science—so despised by the "truly practical" man—shows the absurdity of the experiment, by a few minutes figuring. Some 20 feet square of the ice is all that could have been got rid of.

AN APOLOGY.

This we certainly owe to Colonel Armington, to Mr. Secretary Neal, to all the members of the New England Association of Gas Engineers, and to all our other readers; for the poor work that was made, by detaching the table setting forth the important results of the first-named gentleman, in his experiments on Spontaneous Combustion, from the body of his paper. See pages 121 and 122 of the issue of April 2d.

The mistake arose in making up the forms for the press, in the publication office, and in the absence of the Editor. It unluckily happens that there is no distinct reference in the paper itself to an accompanying tabulation. This does not exonerate us, however, as we should have noticed this and supplied such reference. We shall hope for "better luck next time."

THE AUTOMATIC VALVE OF MR. HUMPHREYS.

In this issue we present a cut and explanation of a new improvement in this device; which, in another form, our readers will remember as figured by us nearly four years ago, June 2, 1871, page 163. The improvement in construction of the present form, while involving the same ingenious principle, will be obvious at a glance. We would call attention to the very meritorious nature of this invention, which accomplishes by so simple and infallible a means, an object of such importance. It certainly seems to us that Mr. Humphreys's valve should be in universal use, and that the profession generally should give their countenance and their assistance to him in making its merits universally understood.

LIGHT-HOUSES.

The use of gas in light houses is a subject which is receiving more and more serious attention on the other side of the Atlantic, and will work its way here in the course of time. We wish to refer now, however, to the attempts that have been made, of late, to "throw dirt" at our distinguished American Light-House Board; whose services to the Nation have been both great and greatly unappreciated.

An illustrious popular lecturer reputed (among drivers of horse-cars, for example) to be the greatest chemist of the age, condescended lately, in one of his sublime productions on "The Creation of the Wor d," to descend to the subject of light-houses, and to pule as follows:—

"He had urged for many years that this city should have some means of illuminating its port. Africa even, he said, is ahead of the United States, because there the light-houses are provided with electric lights, while here we rejoice in what is called the lard-oil light!"

It happens that this matter has been brought before the Secretary of the United States Treasury. He has investigated, and reports that the French electric light of La Herve, goes out every night for short periods; that there are only eight electric light-houses in the world, all these erected experimentally only, and considered yet as experiments; that practical light-house experts in Europe are beginning to find such difficulties in the way of a successful, economical and uniform use of the electric light that they are beginning to contemplate its abandonment; that a "Notice to Mariners" from Trinity House, London, has been received at his Department, definitely announcing the near abandonment of the electric light, at Dungeness light-house, in the English Channel, and a change, among others, to "the most powerful form of oil-light;" etc., etc.

In view of all this may we not venture to beg that our all-powerful popular instructor and expounder of the mysteries of the creation of the world and all other mysteries; will reconsider his blighting condemnation of the Light-House Board, and reverse his dictum as above, when next he holds forth to his numerous admirers.

NEW ORLEANS.

Some of our readers probably will be surprised—and some possibly will not—to hear that the "very pretty quarrel" that has been pending and impending, in New Orleans, has been suddenly quashed, and that now everything is lovely there. The "Crescent City Gas-Light Company" *has been absorbed* into the old New Orleans Gas-Light Company; and hence that "Dies iræ, dies illa," the first of April, on which the citizens looked to see

"brooding Darkness spread his jealous wings,"

has blown over, and perfect peace prevails. Let us be permitted to hope that all the other troubles that hang over that community may be speedily and as completely quelled.

NOTICE.—The attention of the Gas-Fraternity is directed to the advertisement of Messrs. P. H. & F. M. Roots, of Connersville, Indiana, which will be be found on page 170. Their Patent Gas Exhauster is thought very highly of by those who have it in use.

An Eccentric Star.

The most singular fact connected with the proper motions of the stars is that one or two stars are flying through space with such enormous rapidity that the combined attraction of all the stars visible with the telescope could never stop them. This seems to be especially the case with a small star, invisible to the naked eye, designated in astronomical literature as "Groombridge, 1830," from the name of the astronomer who first recorded its position.

The rate of motion of this star is about seven seconds per year—the greatest ever known. It was hence concluded that it must be very near us, and a number of astronomers have sought to determine its parallax, but have found it to be only about a tenth of a second. Its apparent motion in a year being seventy times the distance from the earth to the sun in a year, or 18,000,000 of miles every day, and more than 200 miles every second. From what we know of the distribution, masses, and number of the stars, it seems probable that the attraction of all the bodies in the universe can never stop this headlong speed nor bring this star into any orbit, and that consequently it will pass through our universe, and leave it entirely in its passage through infinite space. If we had accurate observations of the star's position 3,000 or 4,000 years ago. we could speak with more certainty of its destiny. We may expect that our posterity of a few thousand years hence will, by the aid of the observations and tables we shall transmit to them, be able to come to a definite conclusion respecting the age and the structure of the universe.—*Harper's Magazine.*

NOTICE.

AMER. GAS-LIGHT ASSOCIATION.

OFFICE OF THE AMERICAN GAS-LIGHT ASSOCIATION,
No. 117 BROADWAY, NEW YORK CITY.

THE SECOND SEMI-ANNUAL MEETING of the ASSOCIATION will be held at WASHINGTON CITY, D. C., May 12, 1875, at 10 A. M.
Headquarters, WILLARD'S HOTEL.
CHARLES NETTLETON, Secretary.

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34 New Street, G. Y.

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WHO ARE SOON NEEDING

New Lime Trays.

We manufacture in connection with our RATTAN LIME HURDLES, which are the *best without exception*, a SLATTED WOOD TRAY, *cheap, strong, durable* and simple in construction, reversible, and *superior to other Wood Slatted Trays*, which we *offer at* LESS PRICE *than any other in the market.*
Send for Circular.

MANHATTAN LIME HURDLE CO.,
HAVERHILL, MASS.
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MECHANICAL & GAS ENGINEER.

To Gas-Light Co's.

The undersigned respectfully announces his voluntary resignation of the Vice-Presidency of the American Meter Company from the 1st of March last, after filling that position from its organization in 1863, and now offers his services as

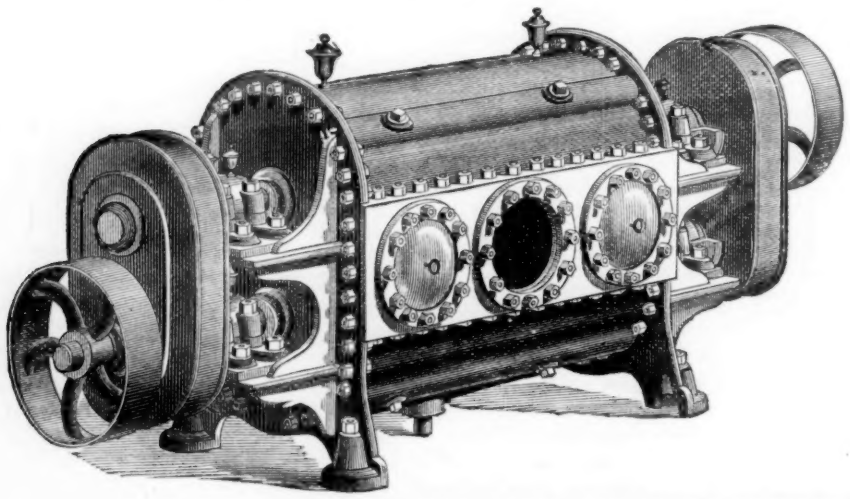
Consulting or Constructing Engineer,

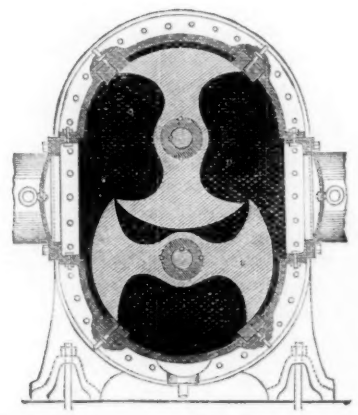
in the erection of new, or the extension of Gas Works.
He is prepared to furnish plans and Specifications, embracing all the latest improvements in the MANUFACTURE OF COAL GAS, at short notice, and on reasonable terms. His experience of THIRTY YEARS in the construction of Gas and Water Works, Railroads, Tunnelling, etc., enables him to refer with confidence to any of the Works erected by him, as a guarantee of satisfaction and ability.

By arrangements with reliable manufacturers of all MATERIAL and SUPPLIES used by Gas Companies, he is prepared to furnish promptly all such orders, with best selections, and to give satisfaction as to prices, terms, etc., and respectfully solicits a share of patronage.

HENRY CARTWRIGHT, Gas Engineer,
2107 GREEN STREET, PHILADELPHIA. 379-6t

PATENT IMPROVED GAS EXHAUSTER.





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S. S. TOWNSEND, GENERAL AGENT, 31 LIBERTY STREET, NEW YORK.

The following are some of the advantages we claim for this Exhauster over all others:

FIRST.—It is simpler in its mechanical construction than any other Exhauster in use.

SECOND.—The internal parts consist of only two revolvers, each cast entire in one piece, without a single screw, bolt, nut, washer, key, or other part to get loose on the inside and stop or break the machine. The internal operating parts, therefore, can not get out order, and hence require no care or attention.

THIRD.—Every part of the machine requiring care or attention, as the journals, gearing, etc., is external, easily observed and attended to. All changes, adjustments, and repairs are made from the outside. The journal bearings, if necessary, can be renewed in a few minutes.

FOURTH.—The internal operating parts are practically gas-tight, but are not in actual contact, hence there is no internal friction or wear. The machine is therefore operated with less power than any other.

FIFTH.—They are built in the most complete and substantial manner, with steel shafts and improved journal bearings, and their durability is almost without limit.

We build them of any required capacity, large or small, adapted to any kind of works or place.

Send for Illustrated Catalogue, giving all particulars as to capacity, speed, power required, dimensions, and price of each size, and references to parties using them.

P. H. & F. M. ROOTS.

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Gear Wheels—Scott, 98 Chambers St., N. Y.....5
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Slade's Automatic Fire Governor—Jas. Slade, Gas Works, Yonkers, N. Y.....
Scotch Fire Brick—S. L. Merchant & Co., 76 South Street, corner Maiden Lane, N. Y.....
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To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

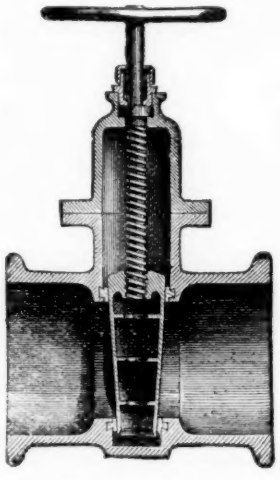
. Reference to them is requested. 204-1y

CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.

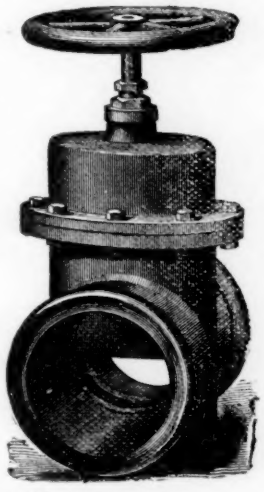


These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is no LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHT and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.



We refer to the following named Gas-Light Companies among the many that have used these Valves:

BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.

SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y.

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.

STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

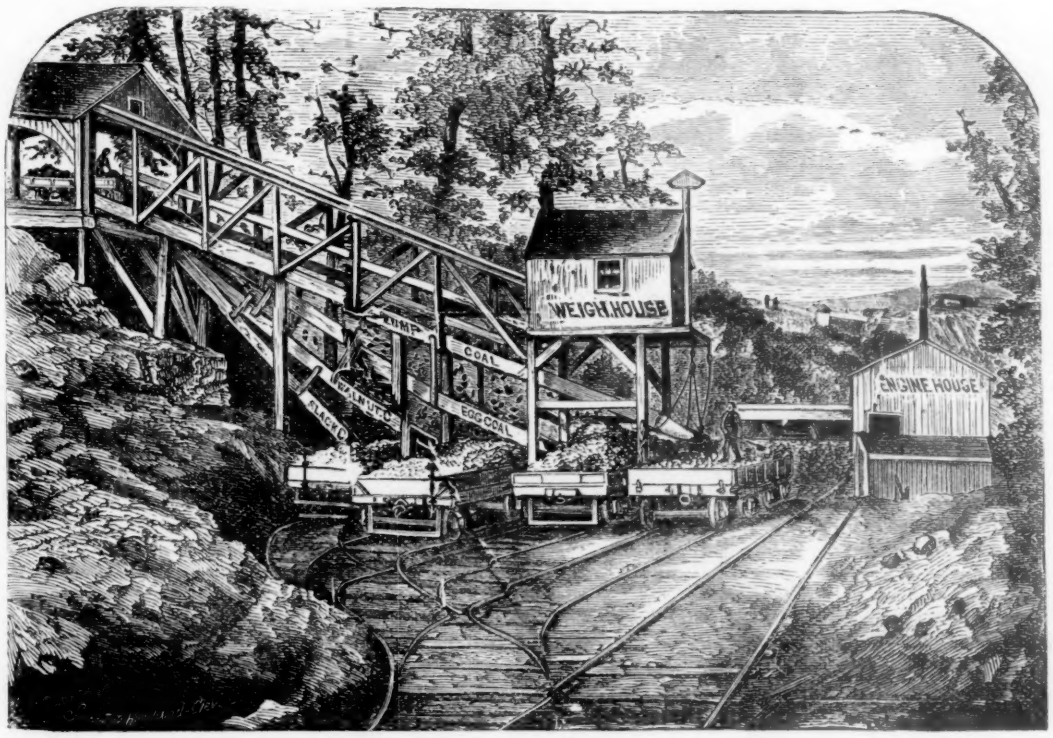
FREEMAN BUTTS COAL ASSOCIATION,

(LIMITED.)

CLEVELAND, OHIO.

CELEBRATED GENUINE STERLING COAL.

American Cannel. Pittsburg and other Gas Coals.



Testimonials.

From Manhattan Gas-Light Co., N. Y.

Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactory—averaging 9,500 cubic feet of 15 candle gas per ton of 2,240 lbs., and 41 bushels of coke weighing 1465 lbs. We consider it among the best American Gas Coals for the quantity and quality of the gas produced, and also for the excellent quality of the coke.

I am, gentlemen, your obedient servant.

CHARLES ROOME, Pres't.

From Buffalo Gas-Light Co., Buffalo, N. Y.

The Sterling Coal we have had from you we find to be an excellent gas coal. The yield of both gas and coke is good. The illuminating power of the gas is high and the quality of the coke is very good.

ROBERT ROBSON, Foreman Gas Works.

From Citizens Gas-Light Co.

ROCHESTER, N. Y., Sept. 2, 1874.

Your favor September 2nd at hand. Yield Sterling Coal to date from July 19, 4·70.

Respectfully yours,

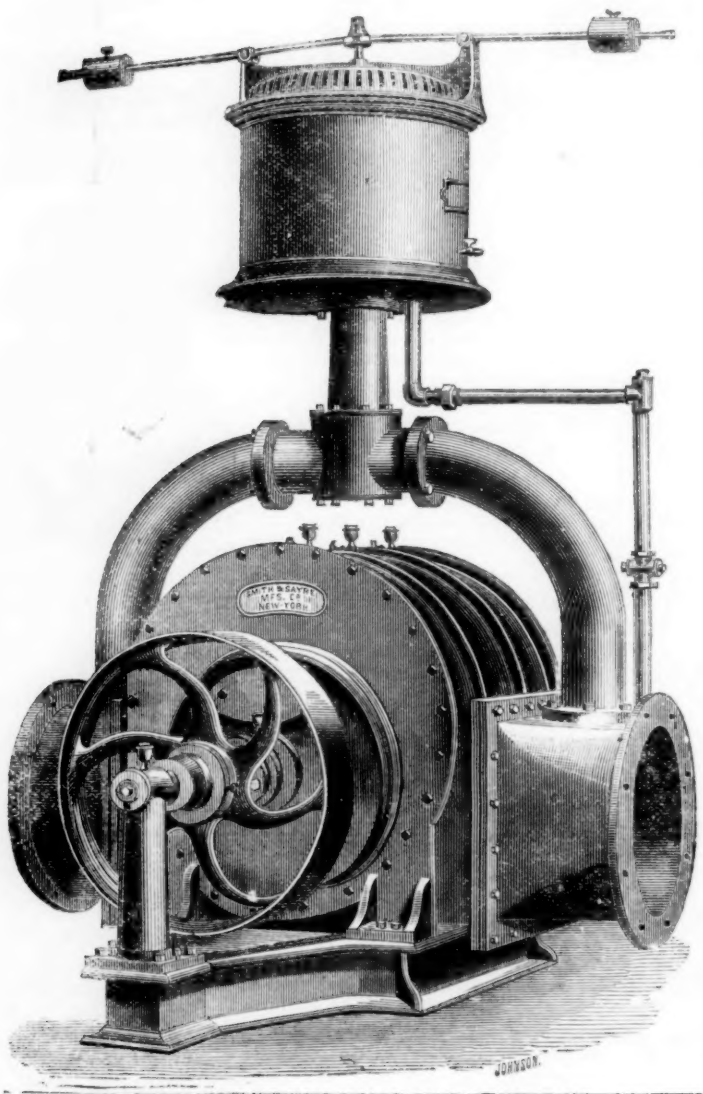
WM. H. WARD, Sec.

Would also refer to the Gas Companies in the following places: New York City (Manhattan and New York Cos), Brooklyn, Albany, Troy, West Troy, Buffalo, Rochester, Oswego, Ogdensburg, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Toronto, Hamilton and Coburg in Canada; Chicago, Ill., and two companies in Milwaukee, Wis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-jo ints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 to 90 tons per hour, will save one quarter of the time required by the old style Cupola and 33 per cent fuel. Address

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JAMES M. SAYRE, Treasurer.
CHARLES W. ISBELL, Secretary.
OFFICE, 95 LIBERTY STREET, New York.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

APRIL 16, 1875.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
English Caking Coals.			
Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
Pictou			2 50
Block House—At Mines, $2 12, Gold			0 00
Caledonia—At Mines, $2 00, Gold			0 00
Little Glace Bay—At Mines, 1 87½, Gold			2 00
Lingan—At Mines, $2 25, Gold			0 00
Sydney—Old Mine			3 00
" Reserve Mine			2 2
" International			— —

(Duty, 75 cents per ton, gold. Freight to New York $2 25 curreucy. Cost of above coals delivered in New York, $5 25 @ $6 00½, currency.)

Pennsylvania Coals.			
Penn Gas Coal—At Amooy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogneny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			12 50
Red Bank—at Philadelphia			7 60
" —at South Amboy			9 00
Asphalts.			
Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

The Waverly Coal and Coke Company of Pittsburgh, have contracted with the Pittsburgh Gas-Light Co. for 40,000 tons of their Youghiogheny coal, on private terms,

GLOUCESTER IRON WORKS.

GLOUCESTER CITY, NEW JERSEY.

DAVID S. BROWN, Pres't. JAMES P. MICHELLON, Sec'y.
BENJ. CHEW, Treas. WILLIAM SEXTON, Sup't.

OFFICE, PHILADELPHIA,

No. 6 North Seventh St., (west side.)

CAST IRON GAS AND WATER PIPE

PIPE CAST VERTICAL.

1½ to 48 inches diameter.

Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS.

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Gas Works 253-6m

SLADE'S

AUTOMATIC FIRE GOVERNOR.

PATENTED AUGUST 4, 1874.

It regulates the speed of Exhausters by controlling the fire. The least pressure on the Retorts opens the Damper in the Boiler Chimney and under the fire, and closes them as soon as the pressure is removed. Saves the boiler, fuel, and all attention, except to supply the fire. Come and see it, or address

JAMES SLADE,
Gas Works, Yonkers, N. Y.

Gas Engineers,

AND PARTIES ENGAGED IN THE BUILDING OF

GAS WORKS,

who desire information regarding PETROLEUM GAS, either or use pure, or for enriching, are requested to address, sta ing particulars.

J. D. PATTON,
363-unl Treverton, Northumberland Co. Pa.

To the Profession.

A YOUNG MAN OF LIBERAL EDUCATION, WHO HAS spent many years in the study of gas, and working in a arge gas works, desires a situation as Superintendent of a works making 10,000 to 50,000 cubic feet daily. Has good reference as to ability; or would act as Assistant in large works. Would prefer a situation on the staff of a gas works uilder—draws well, and has experience in setting up appar-

Address, stating salary, C. P. V., care of W. B. CAR- & Co., Cincinnati, Ohio. 372

P.P. DEILY, J. FOWLER.

1842. *1874.*

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PA.,

Builders of Gas Works.

MANUFACTURERS OF

GAS-HOLDERS,

Single and Telescopic.

WROUGHT IRON ROOF FRAMES,

COAL WAGONS,

COKE BARROWS,

AND ALL

Wrought Iron Work

CONNECTED WITH GAS WORKS.

☞ Particular attention paid to Extensions and Repairs.

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255-121 Secretary, Boston, Mass.

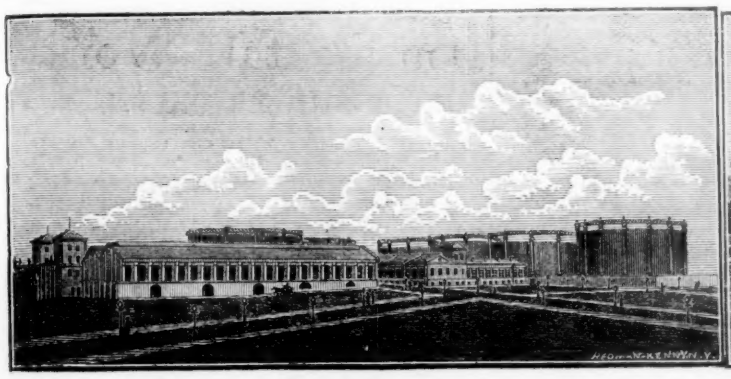
KIDD'S

Gas Consumers' Guide

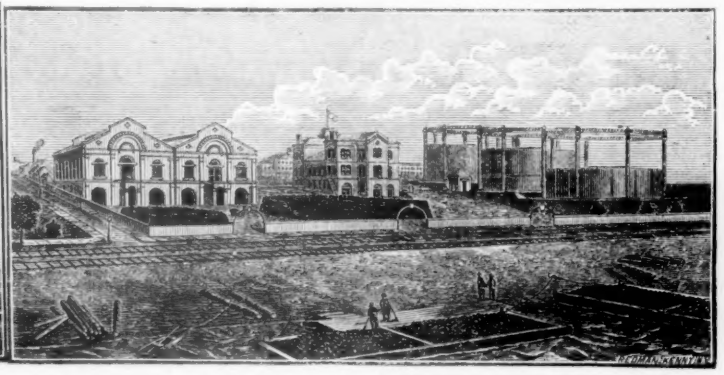
Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaints arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.,
42 Pine Street, New York, Room 18,



CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM. FARMER, ENG.



LACLEDE GAS WORKS ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER.

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL, N. Y.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company, St. Louis Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal.

PATENT FOR SALE.

To Fire Clay Retort Manufacturers.

W. D. CLIFF, of the firm of JOSEPH CLIFF & SON, Wortley, Leeds, England, has recently obtained Letters Patent for the making of CLAY RETORTS by machinery. Besides being made cheaper, they are also made much better than by hand. They are regular and equal in their thickness, and in their length are true and straight throughout, being in all respects far better and handsomer than hand made Retorts. The fact that Messrs. Cliff & Son have for many years been very largely engaged in the making of Clay Retorts will be a sufficient guarantee as to value of the patents. The patentee is wishful to sell the patent right for America. It is No. 155,069, and is for seventeen years from the 15th day of September, 1874.

All particulars may be learned on application to

W. D. CLIFF,
Wortley, near Leeds, England.

580-6t

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Cast Iron Pipes and Fittings,

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Gas and Water Mains.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,
BALTIMORE, MD.

$30 per Dozen.

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Screening Scoop SHOVEL

FOR COKE, COAL, ASHES, AND OTHER SUBSTANCES.

The frames are 12 by 18 inches, with seven bars, and are made of the best malleable Iron. They can be wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—all New York Gas Companies and Hotels.

Price, $30 per Dozen.

Sample sent gratis to any Company, if desired.

☞ Smaller sizes on hand. Please address orders to A. SEE & SON, N. Y. Shovel Works, No. 1358 B'way, N. Y

FOR SALE.

On or about May 1st, 1875,

One 8 Ft. STATION METER

complete, of American Meter Company's make, with a capacity of four hundred thousand cubic feet per day.

For price and any other information address

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Indianapolis Gas-Light and Coke Co.,
Indianapolis, Ind.

875-6t

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses Retorts and all castings required for setting them in the latest and most improve model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varyin from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS ERNORS or REGULATORS, STREET MAINS, from 1½ 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc. STOP VALVES, from 3 to 30 inches, for both Water and Gas.

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All the Smith and Sheet Iron work required in and abou Gas Works. 226-tf

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GAS ENGINEER,

914 OLIVE STREET, ST. LOUIS, MO.

355-

THE

PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station in the Pennsylvania Railroad, and on the Youghiogheny River.

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DESIGNERS AND MANUFACTURERS OF ARTISTIC

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FRENCH BRONZES & CRYSTAL CHANDELIERS.

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NEW YORK AND CLEVELAND

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This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation. on most favorable terms.

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W. P. DE ARMIT, Treasurer.
THOMAS AXWORTHY. Agent at Cleveland, Ohio.

351-1y

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Manufacturers of a superior quality of

Fire-Brick, Clay Gas Retorts,

Gas Tile, Drain Pipe, Fine Ground Fire Clay, &c.

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Portland Cement,
Roman Cement,
Keene's White Cement,

NUMBERS 1 AND 2.

From best London Manufacturers.

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OFFICE AND WORKS—CARROLL, PIKE, SMALLMAN AND WILKINS STREETS,

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Manufacturer of all kinds of GAS and WATER PIPE BRANCHES, CONNECTIONS, T's, ELBOWS, and all CASTINGS USED AT GAS AND WATER WORKS,

We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vercally.

B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞SEND FOR CIRCULAP AND PRICE LIST.☜

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MINED IN TAYLOR COUNTY, WEST VA.

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CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superio Coke, with little Ash, and scarcely any clinker. 304-1y

T. F. ROWLAND,

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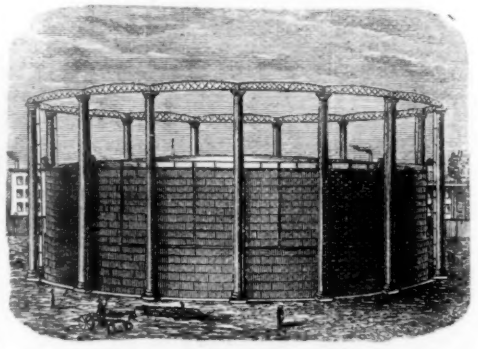
ENGINEER, AND MANUFACTURERS OF



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OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

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(P. O. Box 432.)

BALTIMORE.

Thomas Gemmell, *President.*
A. Robinson, *Vice-President and Treasurer.*
Benjamin Bissell, *Secretary.*

Mines at Wilsonburg, Harrison Co., W. Va Shipping Port, Baltimore.

L. S. BOYER & CO,, GENERAL SALES AGENTS.

The result of use of this coal in *quantity* by several of the largest gas works in the country, is reported as follows, viz. Yield of gas, 10,000 to 10,500 feet per ton of 2,240 lbs.; illuminating power, 16½ to 17½ standard candles; coke, good in quantity and quality. 350-3m

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.
Company's Office, No. 52 S. Gay Street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
SINCLAIR & AGNEW, Agents, Alexandria, Va.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 994-1y

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CANNEL COAL

From West Virginia.

Yields over **13,000** feet of Gas per ton. At ten thousand feet (standard yield) the illuminating power s over **43** candles. Purifies **4,510** feet to the bushel of lime.

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MANUFACTURERS OF

Lap-welded Steam and Gas Pipe,
Tubing and Casing for Artesian, Oil and Salt Wells (WITH PATENT PROTECTING COUPLING),
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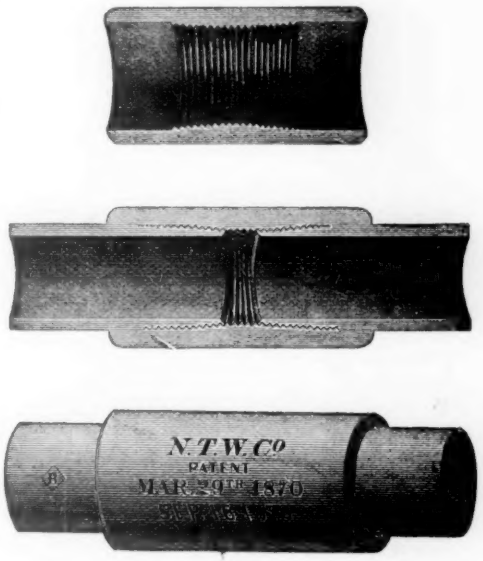
359-1y McKeesport, Penn., near Pittsburgh.

Patent Sleeve or Protecting Couplings



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MANUFACTURERS OF

BRASS COCKS

FOR STEAM, WATER AND GAS.

Plumbers Materials.

WROUGHT IRON PIPE

Gas and Steam Fitters' TOOLS.

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And Every Description of

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Fine Gilt Bronze and Marble Clocks, warranted best Timekeepers, Mantle Ornaments, &c.

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Rear Entrance 140 Mercer Street,) NEW YORK.

Special designs furnished for Gas Fixtures for Churches Public Halls Lodges. &c.

S. FULTON & CO.,

PLYMOUTH IRON WORKS,

CONSHOCKEN, PA.,

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES, AND PUDDLED BARS.

Also, Heavy and Light Castings of every description.

242 South Third Street Philadelphia, Pa.

SAMUEL FULTON, THEO. TREWENDT

THE WAVERLY COAL AND COKE CO.

Offer for Sale the

YOUGHIOGHENY COAL'

DOUBLE SCREENED,

rom their Colliery at Smith's Mills, on the Youghiogheny River, thirty-seven and a half miles southe of Pittsburgh. This Coal has the preference in Pittsburgh over all other YOUGHIOGHENY COAL G[illegible] RPOSES.

The facilities of the WAVERLY COMPANY are unsurpassed by those of any other Company on the Youghiogheny.

Full particulars can be had by addressing

PERKINS & JOB, Agents,
27 South Street, New York.
91 State Street, Boston.

THE WESTMORELAND COAL CO.

CHARTERED 1854.

MINES situated on the **Pennsylvania** and the **Connellsville Railroads** in **Westmoreland County, Pa.**

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Since the commencement of operations by this Company its well known

BITUMINOUS COAL

has been largely used by the **GAS COMPANIES, RAILROADS,** and **IRON and STEEL WORKS** in the **New England** and **Middle States,** and its character is established as having no superior for freedom from sulphur and other impurities.

Principal Office, **No. 230 South Third Street, Philadelphia.**

EDWARD C. BIDDLE, President.
EDMUND H. McCULLOUGH, Sec. FRANCIS H. JACKSON, Vice Pres't

TO GAS COMPANIES.

WANTED—A PERSON OF CHARACTER, AND WHO has had twenty-five years experience in Constructing and Managing Gas Works, desires a position as Engineer or Manager of Works making from 30 to 150,000·000 cubic feet per year.

Refers by permission to George B. Neal, Esq Engineer and Treasurer Charlestown (Mass.) Gas Company; Messrs. Davis & Farnum, Contractors and Builders of Gas Works, 123 Washington street, Boston, Mass. Please address ENGINEER, care of either the above parties. 362-8t

WANTED—A SITUATION AS GAS METER INSPECTOR, by one who is practically used to all the latest improvements, as applied to the Measurement of Gas and the Fittings of the Pipes Has also had long experience in the Photometric Tests and Ammonia and Sulphur Tests as practised by the best methods, and is qualified to inspect all the work connected with this department. Best of references as to ability and experience furnished. Address JAMES M. HAMILTON care of Editor GAS-LIGHT JOURNAL. 377

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RETORT WORKS.
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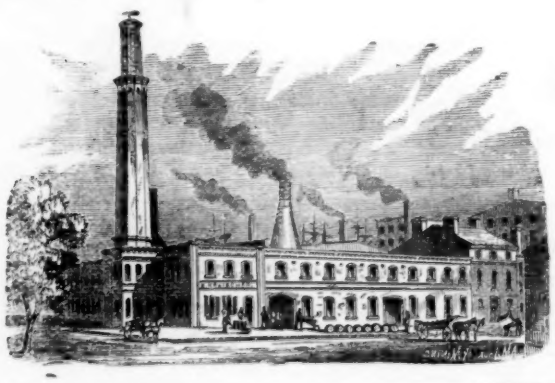

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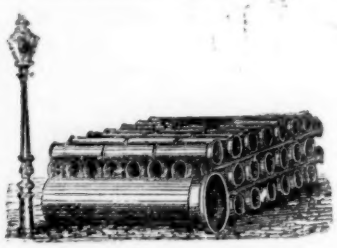

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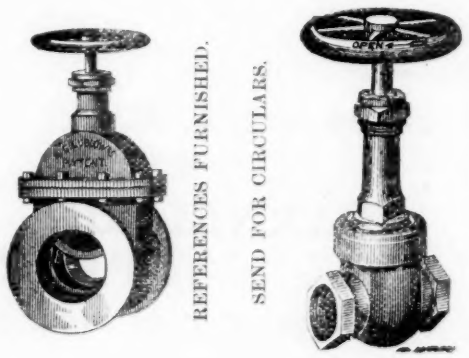

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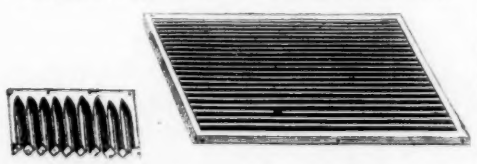

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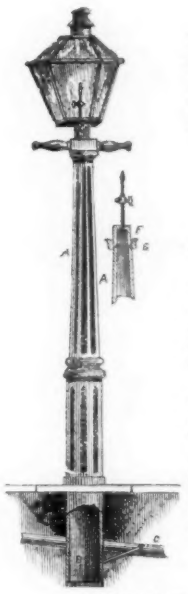

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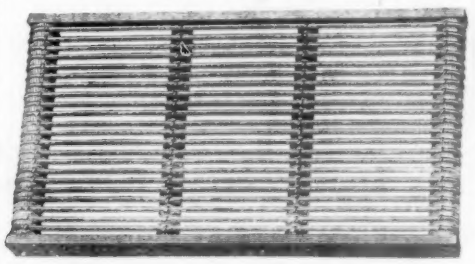

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Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

WROUGHT IRON ROOF FRAMES.—For Slate, or Corrugated Iron Coverings, with Cast Iron Cornice Gutter. Iron Doors and Frames, Wrought Iron Pivot Blinds, Windows and all kinds of Castings and Smith Work for Buildings.

BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates. Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS.— Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead use.

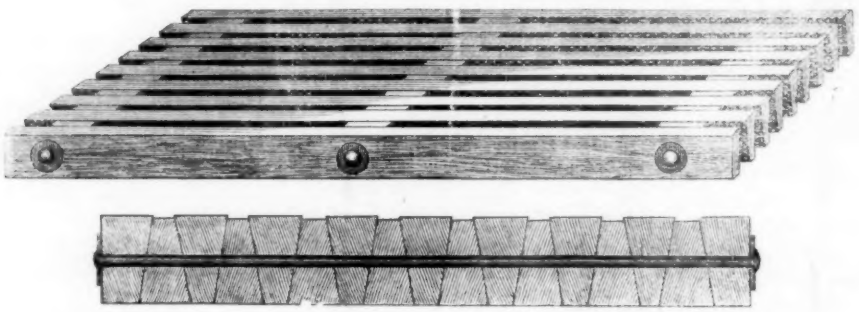
METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gasholders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



In use at the following Gas-Light Companies:

Pittsburg Gas Company, Pa.
Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas-Light Company, N. Y.
Utica Gas-Light Comwany, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.

New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
New Britain Gas-Light Company, Conn.
Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.